DIAGNOSIS OF HYDROSALPINX IN INFERTILE WOMEN: LAPAROTOMY CORRELATION OF RADIOLOGICAL IMPRESSION

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Hydrosalpinx, a condition with terminal tubal disease leading to distally obstructed tube and marked dilatation and sacculation of the ampullary portion, is not an infrequent entity encountered in the course of evaluation of tubal factor in infertile women. Nevertheless, that hydrosalpinx is not clinically diagnosed in infertile women is proved by our earlier observation (Rajan and Joseph, 1979) where hydrosalpinx was not detected in any of the 36 women found to have pelvic masses. However, salpingography quite often ensures a prompt diagnosis of this condition. The accumulation of the contrast medium in the dilated sac produces a sharp outline of the latter when the medium has been injected in an amount sufficient to fill the dilated tube. Water soluble media injected in cases of hydrosalpinx are not absorbed as promptly as in cases of patent tubes, and the medium can be seen to persist within the tubes for several hours. It appears that damage to the tubal mucosa is responsible for some degrees of delayed absorption of the media.

While hysterosalpingography (HSG) is still credited as the procedure of choice in the initial, basic evaluation of the infertile woman, its pitfalls and limitations in diagnosis should be carefully recognised (Hutchins, 1977). Because of the conflicting diagnoses, especially the false positive HSG findings in 20 per cent patients, no infertility investigation can be considered thorough by modern standards unless it includes laparoscopic assessment of tubal function and patency (Gabos, 1977). Whereas this approach is mandatory for diagnosis of bilateral tubal block at any site without dilatation, unilateral tubal block and tubo-peritoneal adhesions where HSG findings are less reliable, we feel diagnosis of hydrosalpinx can be made precisely by salpingography without a recourse to laparoscopy. This view is based on the high percentage of laparotomy confirmation of radiologic impression.

Hysterosalpingographic Evaluation. As As an integral part of basic infertility work-up, HSG was performed in 500 consecutive women over a period of 2 years beginning in March 1977. Included in this study are women whose male partners are infertile and women undergoing donor artificial insemination in addition to those with female infertility problems (Table 1).

HSG was performed as an outdoor procedure after intravenous administration of one ampoule of Baralgan. Water solu-

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TABLE I
HSG in 500 Consecutive Women

Type of women investigated	Number	Percentage
Those with female infertility	320	64.00
Women whose husbands are infertile	81	16.20
Women undergoing AID	99	19.80

ble media, initially Diagenol viscous, subsequently Verografine and presently Conray-420, was employed in the study. After an initial injection of 3 to 5 ml of the media, under fluoroscopic control, one antero-posterior film was taken. This was followed by another exposure taken after injection of 7 to 10 ml of the media. A post-evacuation film was taken 5 to 10 minutes after the completion of injection. In the presence of hydrosalpinx larger amounts of contrast medium was injected. Follow-up films were taken at intervals for one hour after completion of injection.

Hydrosalpinx is diagnosed by the accumulation of contrast medium in the dilated tubes with terminal block. Collection of the medium in the sacculated tube produces a sharp outline of the latter when the medium has been injected in an amount sufficient to fill the dilated tube (Fig. 1). Since there is no peritoneal spill due to distal tubal obstruction and since the diseased tube cannot absorb the medium promptly, the followup film taken after 1 hour shows the collected medium persisting at the distal dilated part of the tube (Fig. 2).

By contrast, peritoneal and peritubal adhesions, without tubal occlusion, are characterised by an abnormal distribution of the contrast medium in the pelvic cavity (Fig. 3). The presence of localised pockets of medium in the follow--up control films is diagnostic of pelvic adhesions (Fig. 4). Collection of contrast medium in the pelvic cavity which is not uniform, is seen localised in the pouch of Douglas, in the ovarian fossa or higher up in the pelvis. Persistence of patches of water soluble medium in the pelvis for more than 2 hours is suggestive of pelvic adhesions. However, the follow-up films show a gradual fading-off of the contrast medium from the areas of pocketed collection.

Hysterosalpingographic findings in 500 women: Tubal dysfunction was diagnosed by HSG in 98 of the 500 women investigated (19.60 per cent). However, when the subjects with male factors were ruled out, the incidence of tubal changes work to 98 for 320 women (30.63 per cent). Among the 98 women with tubal abnormalities by HSG, 19 were diagnosed to have hydrosalpinx (19.40 pe rcent). This gives an incidence of hydrosalpinx of 3.80 per cent for all women and 5.90 per cent for women with female factors (Table II) Table III shows a breakdown

TABLE II
Incidence of Tubal Factor Dagnosed by HSG

HSG findings	No. of patients	Percentage in total women investigated (500)	Percentage in total infertile women (320)	Percentage in tubal factors (98)
Tubal Factors	98	19.60	30.63	
Hydrosalpinx	19	3.80	5.90	19.40

TABLE III
Breakdown of Different Tubal Conditions in 98 Cases

Tubal condition	No of women
Hydrosalpinx	19
Tubal adhesions	22
Bilateral tubal block	28
Unilateral tubal block	29
Total	98

of different tubal conditions in the 98 women with some type of tubal dysfunction. In addition to the tubal abnormalities, uterine anomalies of the major type were diagnosed in 11 subjects (2.20 per cent), which include double uterus in 1, bicornuate uterus in 8 and unicornuate uterus in 2 women.

Among the 19 women with the HSG diagnosis of hydrosalpinx, 9 had bilateral changes and the other 10 had unilateral changes. In those with unilateral hydrosalpinx the contralateral tube showed cornual block in 5 cases, block at the ampullary region in 1 case and normal tubal function and patency in 4 cases (Figs. 5 and 6).

Laparotomy Findings: In none of the 19 women diagnosed to have hydrosalpinx was there any clinical evidence of pelvic masses to suspect such a condition. The diagnosis was clinched by HSG performed as the basic investigative procedure in all infertile women. Among them the first 10 consecutive patients were subjected to laparotomy, without a recourse to laparoscopic examination to confirm the diagnosis. The laparotomy findings and the nature of surgical correction instituted are detailed in Table IV. Among the 10 women operated 6 had bilateral hydrosalpinx and 4 had unilateral hydrosalpinx as per the radiological impression.

TABLE IV
Hydrosalpinx—HSG + Laparotomy Correlation

No.	H.S.G. findings	Laparotomy findings	Surgical treatment
1.	Lt.—Hydrosalpinx Rt.—Cornual Block	Lt—Hydrosalpinx Rt.—Cornual block	Lt.—Salpingoneostomy Rt.—Implantation
2.	Bilateral hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy
3.	Lt.—Hydrosalpinx Rt.—not visualised	Lt.—hydrosolpinx Rt.—hydrosalpinx	Bilateral salpingoneostomy
4.	Bilateral Hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy
5.	Bilateral hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy
6.	Lt.—hydrosalpinx Rt.—Isthmial block	Lt.—hydrosalpinx Rt.—hydrosalpinx	Bilateral salpingoneostomy
7.	Bilateral hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy
8.	Bilateral hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy
9.	Lt.—Normal tube Rt.—hydrosalpinx	Lt.—normal tube with adhesions Rt.—hydrosalpinx	Salpingo-lysis Salpingo-oophorectomy
10.	Bilateral hydrosalpinx	Bilateral hydrosalpinx	Bilateral salpingoneostomy

Laparotomy confirmed bilateral hydrosalpinx in all the 6 patients, which means a complete laparotomy agreement for HSG diagnosis of bilateral hydrosalpinx. However, among the 4 patients with unilateral hydrosalpinx by HSG, even though laparotomy confirmed the findings, there was only partial agreement. While the diagnosis of hydrosalpinx on one side was confirmed, the findings on the contralateral tubes differred from the HSG findings in 2 patients. In 1 case the HSG finding was unilateral hydrosalpinx with isthmial block on the opposite side, which was proved to be a case of bilateral hydrosalpinx at laparotomy. Similarly, in the other case with hydrosalpinx on one side and the other tube not visualised by HSG, there was a laparotomy diagnosis of bilateral hydrosalpinx. Nevertheless, in the remaining 2 cases the HSG findings were confirmed by laparotomy.

These laparotomy observations signify that hydrosalpinx diagnosed by HSG is definite to be confirmed at laparotomy and hence further evaluation of these patients with laparoscopy is not necessary. However, it has to be observed that the reverse is not true. We mean that all cases of hydrosalpinx need not be diagnosed by HSG, as proved by the 2 cases where the contralateral tubes showed proximal occlusion in HSG but laparotomy diagnosis was hydrosalpinx.

Surgical Treatment: All the 8 subjects who had bilateral hydrosalpinx underwent terminal salpingoneostomy. In those with peritoneal adhesions, the ovary and tube were released from adhesions and after ensuring perfect haemostasis the uterus was anteverted by Baldy-Webster procedure or by plication of round ligaments

One patient with unilateral hydrosalpinx and cornual block on the contralateral side was subjected to uterotubal implantation on the side of cornual block and salpingoneostomy on the side of hydrosalpinx. Another patient with one side hydrosalpinx and the other side tubal patency was subjected to salpingo-oophorectomy on the side of hydrosalpinx and release of tubal adhesions on the opposite side where the tube was normal

During the first year of follow-up, among the 8 patients with bilateral hydrosalpinx subjected to terminal salpingoneostomy 1 woman conceived 7 months after the operation. She delivered a healthy male baby at term by caesarean section. At the time of caesarean section both tubes were inspected and it was observed that the right tube was normal and reasonably fimbriated, whereas the left tube was blocked at the terminal end. Hence it was assumed that conception occurred through the right tube. The patient who had uterotubal implantation on one side and salpingoneostomy on the opposite side had a review HSG done after 8 months of operation. The tube in which hydrosalpinx was corrected was found to have normal patency, whereas the other tube which was implanted could not be visualised.

Comments

Salpingography gives reliable details about the tubal lumen and reveals the size of a distally obstructed tube, but not the condition of its fimbriae, the degree of tubal fixation, or endosalpingeal destruction (Siegler, 1977). It is realised that persistent, localised collections observed on the follow-up x-ray film suggest terminal tubal disease. Boyd and Holt (1973) made a diagnosis of hydrosalpinx by hysterosalpingography in 130 instances, and subsequent laparotomies disclosed

good correlation except in 4 (3.10%) patients. However, hysterosalpingographic interpretations of distal obstruction without dilatation is less accurate because at laparoscopy many tubes show patency with peritubal adhesions.

Among the 10 patients diagnosed to have hydrosalpinx in our series, laparotomy confirmed the diagnosis in all the cases, even though HSG diagnosis of unilateral hydrosalpinx in 2 instances was proved to be bilateral lesions by laparotomy. Hence we hold that a diagnosis of hydrosalpinx can be made with confidence from the radiological impression of HSG, and depending on the X-ray findings a decision on the surgical management is justifiable. Conversely, a negative X-ray finding does not rule out the possibility of hydrosalpinx and such cases will be benefited by laparoscopic evaluation, and this is particularly so in occasions where the HSG indicates proximal tubal occlusion or a distal block without dilatation.

In addition to the predictable diagnosis of hydrosalpinx, radiological impression has prognostic role in women undergoing salpingoneostomy. In a retrospective study, Ozaras (1968) found that only patients who had slight dilatation and linear mucosal markings (diagnosed by radiologic rugal markings) (Fig. VII) conceived after ampullary salpingoneostomy. The presence of rugal markings in HSG indicated minimal endosalpingeal disease, 60 per cent of the patients conceiving after salpingoneostomy, while in the absence of rugal markings only 7 per cent became pregnant. Thus detection of rugal markings by HSG in patients with hydrosalpinx offers added advantage in predicting the possibility of pregnancy following tuboplasty. Similarly, large terminal dilatations without luminal markings observed by HSG is considered to be a poor prognostic sign. If ampullary disease is associated with salpingitis isthmica nodosa (Fig. VIII) which can be diagnosed easily by HSG, tuboplasty is contraindicated.

Conclusion

Our experience with hysterosalpingographic diagnosis of hydrosalpinx is that a positive finding has got 100 per cent laparotomy correlation, whereas a negative finding does not exclude the possibility of hydrosalpinx, which is best confirmed by laparoscopy. We have also reviewed the prognostic value of HSG in subjects undergoing salpingonoestomy.

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See Figs. on Art Paper III-IV